

Miss. & Mo. Valley

Michigan during the 12th, and over Michigan and Lake Huron during the night of the 12-13th. Destructive local storms occurred at distances varying from one hundred and fifty to three hundred miles to the southward of the centre of the main depression during the afternoon of the 12th. At Saint Louis, Mo., a storm passed over the city at about 5 p. m. (75th meridian time), in a straight line from southwest to northeast, the path of destruction varying in width from five hundred to two thousand feet. The storm was preceded by thunder and lightning, and accompanied by heavy rain which lasted about three minutes. In the path of the storm three persons were killed, several injured, and about one hundred houses blown down or damaged, the greatest damage being done where the path of the storm was narrowest. The maximum wind-velocity at the Signal Service office was 56 miles per hour from the southwest. Crossing the Mississippi River the storm reached Brooklyn, Ill., distant about four miles from Saint Louis, where it caused considerable damage. At about the same hour a storm struck Clinton, Ky., killing ten persons, injuring upward of fifty others, and doing immense damage to buildings, many of the smaller of which were lifted bodily from their foundations. The path of the storm at Clinton was about three hundred yards wide. Great destruction was also caused at other places in western Kentucky, notably at Wickliffe and Moscow, and at points in the middle Mississippi and Ohio valleys. On the 12th a heavy snow storm, with high wind and falling temperature, prevailed over Minnesota, the Dakotas, Nebraska, Kansas, and Iowa, which, from Minnesota and the Dakotas

southwestward over Kansas, was a veritable "blizzard," the snow drifting heavily and causing a general blockade of the railroads. On the 12th and 13th the storm along the lower lakes and over Lake Huron was one of the severest experienced in many years, and was attended by fatalities and great destruction of property. At Springfield, Ill., the wind reached a maximum velocity of forty-four miles per hour from the southwest at 2.15 a. m. of the 13th. At Port Huron, Mich., a maximum velocity of seventy-two miles per hour from the southwest was registered at 7.35 a. m. of the 13th, and the storm was reported the severest that had been experienced at that place since the opening of the Signal Service station in 1874. At Buffalo, N. Y., the storm was reported the severest since the opening of the Signal Service station in 1870; the wind attained a maximum velocity of ninety miles per hour from the southwest at 11.15 a. m. of the 13th; great damage was caused to property in the city and vicinity, and the water in Lake Erie reached a height 7.6 feet above the mean water mark at 2.30 p. m. of the 13th, flooding that portion of the city called "the Island." At Rochester, N. Y., the anemometer became disabled at 10 a. m. of the 13th, at which time a velocity of sixty miles per hour from the west was recorded. At Oswego, N. Y., the storm was reported the most destructive of the season. The wind reached a maximum velocity of fifty-two miles per hour from the west at 2.11 p. m. of the 13th; several buildings were unroofed and other damage done. Severe disturbances also occurred over the Lake region during the 19th and 20th.

Lake Region

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several stations; the highest and lowest water during January, 1890, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, January, 1890 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La.	29.9	18	21.0	2	10.8	10.2
<i>Arkansas River:</i>						
Fort Smith, Ark.	22.0	16	14.2	1, 2	1.8	12.4
Little Rock, Ark.	23.0	18	17.3	1	4.2	13.1
<i>Missouri River:</i>						
Ft. Buford, N. Dak.	21.0	31	6.9	8	0.2	6.7
<i>Mississippi River:</i>						
Saint Paul, Minn.	14.5					
La Crosse, Wis.	24.0					
Dubuque, Iowa	15.0					
Davenport, Iowa	15.0	14	2.2	5	1.0	3.2
Keokuk, Iowa	14.0	20	6.0	8, 9	2.4	8.4
Saint Louis, Mo.	32.0	18	14.4	1	5.0	9.4
Cairo, Ill.	40.0	20, 21	43.7	2	18.5	25.2
Memphis, Tenn.	34.0	26	34.6	2	14.4	20.2
Vicksburg, Miss.	41.0	31	41.5	5	19.1	22.4
New Orleans, La.	15.0	31	13.3	5, 6, 7	5.9	7.4
<i>Ohio River:</i>						
Pittsburgh, Pa.	22.0	16	20.0	2	5.6	14.4
Parkersburg, W. Va.	38.0	18	29.9	3	8.9	21.0
Cincinnati, Ohio	50.0	21	43.8	5	18.9	24.9
Louisville, Ky.	25.0	22	20.2	2	9.2	11.0
<i>Cumberland River:</i>						
Nashville, Tenn.	40.0	22	36.3	11, 12	9.0	27.3
<i>Tennessee River:</i>						
Chattanooga, Tenn.	33.0	23	13.0	8, 12, 13, 15	4.6	8.4
Knoxville, Tenn.	29.0	24	7.3	12	1.5	3.8
<i>Monongahela River:</i>						
Pittsburgh, Pa.	29.0	16	20.0	2	5.6	14.4
<i>Savannah River:</i>						
Augusta, Ga.	32.0	31	9.4	26, 29	6.8	2.6
<i>Willamette River:</i>						
Portland, Oregon ..	15.0	31	10.0	6	0.8	9.2

* Frozen.

The above table shows that the water was 3.7 above the danger-point at Cairo, Ill., on the 20th and 21st; 0.6 above at Memphis, Tenn., on the 26th; 0.5 above at Vicksburg, Miss., and 0.3 above at New Orleans, La., on the 31st.

ICE IN RIVERS AND HARBORS.

Lake Michigan.—Sheboygan, Wis.: the lake was entirely free from ice on the 3d, and boats could have passed through the straits. Small vessels were freighting lumber between Duncan and points above. Milwaukee, Wis.: a steamer arrived from Port Huron, Mich., on the 6th. This was the first arrival from a lower lake port in 1890, and the earliest arrival on record. Reports show that the Straits of Macinac were still open to navigation on the 31st, a condition never before known at that season of the year.

Thunder Bay.—Alpena, Mich.: Thunder Bay and Thunder River froze over on the 16th, closing navigation.

Lake Ontario.—Oswego, N. Y.: a schooner arrived from Kingston, Ontario, on the 16th, and the same boat returned to Kingston on the 18th. This was the latest trip made on Lake Ontario by either steam or sailing vessels in ten years.

Machias River.—Machias, Me.: the river was closed to navigation by ice on the 12th.

Saco River.—Biddeford, Me.: the river was closed to navigation by ice during the night of December 31st. The shipping season was reported the longest ever known at that place.

Detroit River.—Detroit, Mich.: floating ice in river, 25th and 26th.

Saint Mary's River.—Sault de Ste. Marie, Mich.: the river froze over for the first time this season on the 9th.

Mississippi River.—Davenport, Iowa: floating ice in river, 6th, 7th, and 8th. The river froze over on the 16th.

Missouri River.—Kansas City, Mo.: an ice gorge in the river at, and above, Saint Joseph, Mo., in the early part of the month, lowered the stage of the water at Kansas City to a point about two feet below the record, exposing the main suction pipe of the water works. Floating ice in river, 28th, 29th, and 30th.

LOW TIDE.

New London, Conn., 22d: owing to the strong northwest wind, the tide was very low in the harbor. Norwich, Conn.: the tide was lower in the Thames River on the afternoon of the 22d than it had been for several years.

FLOODS.

Continuous heavy rain during the first few days of the month caused floods in parts of southern Missouri, eastern Arkansas, and northern and eastern Texas, which destroyed property to the value of millions of dollars; and during the first decade of the month heavy rain caused streams in central, southern, and western Illinois, and southern Indiana to overflow their banks, entailing considerable damage to farming and railroad property. Reports of the 15th and 16th stated that many of the smaller streams in western Pennsylvania and West Virginia were over their banks and doing much damage; and reports from Carini, Ill., dated the 16th, stated that a portion of that city was flooded and that lowlands were under water by an overflow of the Little Wabash River. A report from Eureka, Cal., dated the 13th, stated that in consequence of the continuous heavy rain the rivers in that vicinity were flooding the lowlands,

sweeping away bridges, and doing other damage, and a report from the same place dated the 24th stated that the Eel River had overflowed its banks, and that a considerable area of the valley was under water. On the 25th a portion of Los Angeles, Cal., was flooded by a rise in the Los Angeles River; portions of the levee were washed away and washouts occurred on the railroads. During the latter part of the month warm rains melted a large amount of snow in the Sierra Nevada and Sierran mountains in northern California, causing streams to overflow their banks, washing away railroad bridges and levees, filling cuts, flooding towns, and causing land slides. The damage was especially heavy in Sacramento, Sonoma, Napa, Solano, and Santa Clara counties, and in the San Joaquin Valley. On the 27th a small portion of Fresno, Cal., was flooded, and the canals in that region overflowed, flooding large tracks of country.

ATMOSPHERIC ELECTRICITY.**AURORAS.**

Yankton, S. Dak.: an almost perfect auroral corona was observed from 8 to 8.20 p. m., 11th. The beams, twelve in number, were of a white light and shot up from near the horizon to the zenith from all quarters of the sky except due south.

Northfield, Minn.: an aurora was observed at 4.35 a. m., 18th, eastern time. The display was evidently an extensive one, as the light was very bright in the horizon, and extended 45° east and west of the north point. A pall of black clouds hung like a curtain over the upper portion of the aurora.

Fort Buford, N. Dak.: an auroral band, in the form of an arch of light gray color, was observed at 10.30 p. m., 18th. At that time the arch had an altitude of 10°, and rose steadily until it reached altitude 20°, when it covered 65° of the horizon between northwest and northeast. The aurora continued into the night. A slight auroral light was observed on the 21st.

Fort Custer, Mont.: a faint aurora was visible in the north from 9.45 p. m. to 11.30 p. m., 20th. The display was in the form of a wavy curtain of a diffuse light which rose to altitude 12°, and extended from azimuth 180° to 216°.

Auroras were observed during the month as follows: 2d, Morris, Minn. 3d, Hess Road Station, N. Y. 11th, Yankton, S. Dak. 17th, Voluntown, Conn.; Davenport, Iowa; Cornish, Eastport, and Orono, Me.; Leicester and Newburyport, Mass.; New England City and Steele, N. Dak.; Scranton and Webster, S. Dak. 18th, Orono, Me.; Northfield, Minn.; Glendive, Mont.; Fort Buford and New England City, N. Dak.; Scranton, S. Dak. 20th, Fort Custer, Mont.; Egg Harbor City, N. J. 21st, Davenport and Wesley, Iowa; Orono, Me.; Moorhead, Minn.; Fort Buford, N. Dak. 23d, Morris, Minn. 28th,

Nashua, N. H. 30th, Era, Idaho. 31st, Morris, Minn.; North Hammond, N. Y.

ZODIACAL LIGHT.

Northfield, Minn., 20th: the zodiacal light is quite brilliant in the western sky at this season of the year. The light has a whitish color and extends half way from the horizon to the Pleiades, its shape being slightly parabolic, with the vertex in the sky, sloping off to the northward. It has been learned that at this season of the year the light is usually quite as brilliant as it is now, and attempts have been made to photograph it here.

THUNDER-STORMS.

No severe or destructive thunder-storms were reported during the month. East of the Rocky Mountains thunder-storms were reported in the greatest number of states and territories, eleven, on the 12th; in eight on the 1st, 2d, and 19th; in five on the 20th, and in from one to four, inclusive, on the 3d to 8th, 10th, 11th, 13th to 16th, 18th, 20th, 22d, 24th, 25th, 28th, 29th, and 31st. No thunder-storms were reported east of the Rocky Mountains on the 9th, 17th, 21st, 23d, 26th, 27th, and 30th.

East of the Rocky Mountains thunder-storms were reported on the greatest number of dates, nine, in Illinois; on eight in Louisiana and Tennessee; on seven in Arkansas, Kansas, and Texas; on from one to six, inclusive, in Alabama, Connecticut, Indiana, Indian Territory, Iowa, Kentucky, Mississippi, Missouri, New York, Ohio, Pennsylvania, and Vermont. In states and territories other than those named no thunder-storms were reported. The only states west of the Rocky Mountains reporting thunder-storms during the month were: California, on the 3d, 17th, 22d, 23d, and 24th; Montana, on the 1st and 29th, and Washington, on the 1st.

MISCELLANEOUS PHENOMENA.**DROUGHT.**

Bermuda, Ala., 31st: owing to dry weather small streams in this section have become dry, which is an unusual occurrence at this season of the year.

Matanzas, Fla.: this month has been remarkable for long continued droughts. The orange crop has been damaged to a considerable extent.

HALOS.

Fort Custer, Mont., 14th: a brilliant solar halo of 22° radius was visible from soon after sunrise until 4 p. m. During a portion of the time, particularly about noon, a second halo of 46° radius was also visible. This halo was partial, the upper segment alone being visible; a parhelic circle passed through

both halos, causing bright parhelia at each point of intersection. A vertical column also passed through the sun, its appearance, with the parhelic circle, dividing the halo of 22° radius into four segments.

Solar and lunar halos were reported in the Atlantic coast states, mostly in New England and the middle Atlantic states, on twenty-two dates. On twenty-one dates rain or snow fell in that region on the dates for which the halos were reported; on twenty dates on the second day; and on eighteen dates on the third day following the halos. In the central valleys halos were reported, mostly north of the thirty-fifth parallel, for twenty-nine dates. On twenty-six dates rain or snow fell on the dates for which the halos were reported; on twenty-six dates on the second day; and on twenty-three dates on the